heating the saturated steam to at least about 300°F in a second steam generator to form said superheated steam.

REMARKS:

This Amendment is responsive to the Office Action mailed September 24, 2001, wherein Claims 22 – 29 were rejected under 35 U.S.C. §112 as being indefinite, Claims 1 – 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lechler (U.S. Patent No. 1,727,995) in view of Elliott, et al. (U.S. Patent No. 2,602,388), Claims 11, 12, 14, 15, 19 – 21, 22 – 29, and 30 – 36 were rejected under §103(a) as being unpatentable over Lechler in view of Yashugin (RU 2002400 C1), Claims 37 – 43 were rejected under §103(a) as being unpatentable over Lechler, Claim 13 was objected to as being dependent on a rejected base claim and would be allowable if presented in independent form, and Claims 16 – 18 were allowed. New Claims 44 – 46 are presented herein. **Claims 1 – 46 are pending in the application.**

Attached hereto is a marked-up page version of the changes made to Claims 11 and 22 by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES**". Applicant respectfully submits that no new matter has been entered by the presentation of new Claims 44 – 46, or by the amendment to Claims 11 or 22. For the reasons set forth below, Applicant respectfully submits that all remaining claims in this application are patentably distinct over the prior art of record. Reconsideration and allowance of all pending claims in the application are respectfully solicited.

New Claims

New Claims 44 – 46 recite steps for the generation of superheated steam. Support for Claims 44 – 46 are found throughout the Specification, Drawings and original Claims. One example in support of the new claims, the Specification in column 3, lines 22 – 35 describes an embodiment in which superheated steam is formed as claimed.

§112 rejection of Claims 22 - 29

Claims 22 - 29 was rejected under 35 U.S.C. §112, 2nd paragraph as being indefinite. In response, Applicant has amended Claim 22 which, along with dependent Claims 23 – 29, are

now believed patentable over the prior art.

The Examiner requested clarification of "the growth" recited in Claim 22. Amended Claim 22 more fully recites the growth as "a growth of suckers or canes." Support for this amendment is found in column 2, lines 1 – 8 of the Specification, and specifically by the sentence that notes that "[s]tray suckers or canes sometimes tend to grow from the root stock below the graft point, and the inventive apparatus can be used to remove these undesirable suckers by application of the superheated steam."

Claim 22 as amended particularly points out and distinctly claims the subject matter which the applicant regards as his invention. Reconsideration and withdrawl of the rejection of Claim 22 and dependent Claims 23 – 29 under Section 112, 2nd paragraph is respectfully requested.

§103(a) rejection of Claims 1 – 10 as being unpatentable over Lechler in view of Elliott, et al.

Claims 1 – 10 were rejected under §103(a) as being unpatentable over Lechler in view of Elliot, et al. Applicant traverses this rejection on the grounds that a *prima facie* case of obviousness has not been established. In particular, establishment of a *prima facie* case of obviousness requires that there must be some suggestion or motivation to modify the reference or to combine reference teachings.

The claimed invention is directed to a method for generating superheated steam and delivering the steam to soil in a field to kill undesired organisms. The method for generating superheated steam comprises:

- generating steam in a first steam generator, the steam having water droplets therein;
- removing substantially all the water droplets from the steam so as to form steam substantially free of water droplets; and
- heating the steam substantially free of water droplets to at least about 300°F in a second steam generator to form superheated steam.

As described in the Specification, the generation of superheated steam by this method has important advantages over other methods of generating superheated steam. Specifically, removal of water droplets prior to superheating allows for more efficient heating of the steam

without using energy to vaporize the water droplets, resulting in a steam or a high quality saturated steam vapor at the steam separator output and the output of the second steam generator (column 6, lines 8 – 30).

Neither Lechler nor Elliott, et al., individually or in combination, teach, disclose or suggest delivering a superheated steam from which substantially all of the water droplets are removed before heating to form superheated steam, and then using the steam to treat soils or plants.

Lechler discloses a device for exterminating vermin using superheated steam. The device has a boiler which feeds into a separate superheater. There is no indication or suggestion within Lechler to remove water droplet prior to superheating. In addition, the device of Lechler is clearly intended for use in a building (page 2, lines 44 - 52), and there is no teaching, disclosure, or suggestion of an agricultural method.

Elliott, et al. disclose a device and method for treating soils with superheated steam. In Elliott, et al. water is heated in a first steam generator and then superheated in a second generator. No effort is made to remove water droplets between the two generators, the second generator heats both water droplets and steam. Elliott, et al. does not teach, disclose or suggest removing water droplets prior to superheating as in the claimed invention. This may be why even Elliott, et al. appears to have found the apparatus and use therefore described in Elliott's earlier patent no. 2,272,190 ("Elliot") usefully improved. Thus Elliott describes injecting superheating steam into the soil directly in the ground, while Elliot, et al. improves on the process of Elliott by removing the soil from the ground for treatment. The intention of the improvement of Elliott, et al. over Elliott is to provide for more immediate and direct contact with the soil (Elliot, et al., col. 3, lines 12 – 29).

The Examiner has stated that it would have been obvious to deliver steam to a depth of two inches by combining Lechler and Elliott, et al. There is no suggestion or motivation in Lechler to treat a soil either on its surface or by injection therein. In addition, Elliott, et al. teaches removing the soil from the ground for treatment, and the improvement from Elliott represented by Elliott, et al. clearly teaches the need for such a treatment method. In contrast to Elliot et al., the claimed invention is practiced without the need to dig up and remove the soil

from the ground, and yet superheated steam of sufficient quality and treating characteristics can be selectively delivered to selected areas, such as to penetrate the soil to a depth in the range of about two inches to twenty inches, and in a manner effective for killing undesired organisms, such as nematodes, in a field intended for planting.

The Examiner has also stated that the second steam generator of Elliott, et al. would inherently remove substantially all of the water droplets from the steam. Applicant respectfully disagrees. Applicant notes that the invention of Claim 1 differs from Elliott, et al. because water droplets are removed according to the present invention prior to superheating. This added step is different from an "inherent" removal of water droplets by heating. In addition, removal of the water droplets is not the inherent result of simply heating the steam, as it depends on the initial state of the steam and the amount and manner in which heat is added thereto. As noted above, removal of water droplets between heating stages according to the inventive method has the advantage of reducing the size of the superheater since no evaporation occurs in the superheater.

It is thus seen that the cited references, either individually or in combination, do not teach each of the limitations of independent Claim 1. Specifically, neither Lechler nor Elliott, et al. disclose or suggest removing water droplets prior to heating to form superheating steam. Lechler does not disclose or suggest agricultural uses of the Lechler device, and Elliott, et al. discloses a process that removes soil from the ground for treating, contrary to the claimed invention and does not remove water droplets from the steam prior to superheating. As such, a *prima facie* case of obviousness has not been established for independent Claim 1 and dependent Claims 2 – 10.

§103(a) rejection of Claims 11, 12, 14, 15, and 19 – 21 as being unpatentable over Lechler in view of Yashugin

Claims 11, 12, 14, 15, and 19 – 21 were rejected under §103(a) as being unpatentable over Lechler in view of Yashugin. In response, Applicant has amended Claim 11 which, along with dependent Claims 12, 14, 15, and 19 – 21, are now believed patentable over the prior art.

Yashugin describes a device for defoliating cotton prior to harvest by subjecting the plant to hot combustion products. An independent translation of the entire reference to Yashugin has

been obtained, and is submitted herewith. The device of Yashugin is towed by a tractor through a field and burns organic fuel, specifically a mixture of kerosene and fuel oil, in the exhaust of the tractor. The resulting mixture of combustion products, which preferably has a gas temperature of 170 – 190 °C, sprayed for 20 – 25 seconds onto cotton plants surrounded by a movable chamber. The steam in the device of Yashugin thus results from a hydrocarbon fuel combustion process, and as such results in a mixture having less than 20 mole percent water.

Yashugin notes that described device and method has several shortcomings, including a low efficiency, the production of carbon dioxide, and increased engine wear from regulation of exhaust gas flow rate. In addition, Yashugin also has additional problems that are not disclosed therein but are well known to those skilled in the art. Yashugin produces hot gases through the injection and combustion of oils in diesel combustion products. In addition to the notorious pollution concerns of diesel exhaust, which include copious quantities of soot and unburned fuel, it is also difficult to cleanly burn oils as described in Yashugin. Specifically, Yashugin teaches generating hot gases through multiple, heterogeneous combustion processes which are known to result in soot, unburned and partially burnt fuels, and products of combustion. Most of these impurities have detrimental effects on crops, including but not limited to discoloration and aftertaste.

In response to the rejection, Applicant has amended Claim 11 to recite generating a flow *substantially comprising* superheated steam. Support for this amendment is found throughout the specification of the claimed invention, which shows an embodiment where the flow is generated by heating water, and thus at superheated conditions is a flow substantially comprising superheated steam.

Applicant submits that Claim 11 as amended distinguishes over the prior art. Yashugin discloses the use of combustion gas products for defoliating cotton. Combustion of hydrocarbons in air typically produces ~20% water, limited by the production of carbon dioxide and the large fraction of nitrogen in air[1], and thus cannot generate a flow substantially comprising superheated steam. Thus there is no teaching or disclosure in Yashugin to use a flow

[1] See, for example, Van Wylen and Sonntag, Fundamental of Classical Thermodynamics, 2nd Edition, New York, page 487.

substantially comprising superheated steam, as claimed. In addition, there is no motivation or suggestion for substituting the combustion gases of Yashugin with a flow substantially comprising superheated steam for defoliating plants, and there is no apparent way of modifying Yashugin to produce a flow substantially comprising superheated steam – Yashugin only discloses discharging combustion gases directly onto cotton and does not have a heat exchanger for producing superheated steam.

Lechler discloses a device for exterminating vermin using superheated steam. The device of Lechler is intended for use in exterminating vermin in a building, and there is no teaching, disclosure, or suggestion to use it to treat soils or to defoliate plants. In addition, The Examiner's statement that Lechler *could* have been modified to defoliate plants is not sufficient to establish prima facie obviousness without a suggestion to use Lechler to defoliate (MPEP 2143.01). The Applicant respectfully reminds the Examiner that combining these references to render the claimed invention obvious involves the use of hindsight, which is impermissible in establishing a *prima facie* case of obviousness *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

It is thus seen that the cited references either individually or in combination, do not teach each of the limitations of independent Claim 11 as amended. In addition, there is no motivation to combine the references to obtain the invention as claimed in Claim 11 for the reasons noted above. For these reasons, Claims 11, 12, 14, 15, 19 – 21 are believed to be patentable over the prior art.

§103(a) rejection of Claims 22 – 29 and 30 – 36 as being unpatentable over Lechler in view of Yashugin

Claims 22 – 29 and 30 – 36 were rejected under §103(a) as being unpatentable over Lechler in view of Yashugin. Applicant traverses this rejection on the grounds that a *prima facie* case of obviousness has not been established. In particular, establishment of a *prima facie* case of obviousness requires that there must be some suggestion or motivation to modify the reference or to combine reference teachings.

Claims 23 – 29 depend on independent Claim 22, which recites generating a flow of

superheated steam and delivering the flow of superheated steam to a plant having a graft, where said delivering is sufficient to inhibit a growth on said plant. The Examiner has stated that cotton is a shrub with a graft, and furthermore doubts the existence of such a plant outside of experimental research. Applicant respectfully requests support of these statements as they apply to the rejection. Applicant also respectfully submits that Yashugin does not disclose, teach or suggest the use of the method of Yashugin on a grafted plant, and there is no motivation within the references to apply the method of Lechler to a graft, or more generally to any plant whatsoever. Thus, there is no teaching, suggestion or motivation within the references individually or in combination to treat a plant having a graft, and as such a *prima facie* case of obviousness has not been established for independent Claim 22 and dependent Claims 23 – 29.

Claims 30 – 36 depend on independent Claim 30 which recites generating a flow of superheated steam and delivering the flow of superheated steam adjacent to a graft sufficient to inhibit a growth adjacent to said graft. Again, there is no teaching, suggestion or motivation within the references individually or in combination to specifically inhibit a growth adjacent to a graft, and as such a *prima facie* case of obviousness has not been established for independent Claim 30 and dependent Claims 31 – 36.

§103(a) rejection of Claims 37 – 43 as being unpatentable over Lechler

Claims 37 – 43 were rejected under §103(a) as being unpatentable over Lechler. Applicant traverses this rejection on the grounds that a *prima facie* case of obviousness has not been established.

Claims 38 – 43 depend on independent Claim 37, which is directed to a method of generating a flow of superheated steam and delivering the flow of superheated steam to fumigate a plant. The Examiner has stated that it would have been obvious to one skilled in the art to apply the method of Lechler to fumigate a plant.

Applicant respectfully submits that the Examiner has mischaracterized Lechler by stating that "Lechler discloses an agricultural method." As previously noted, Lechler discloses a device for exterminating vermin in a building (page 2, lines 44 - 52) using superheated steam. There is no disclosure, teaching or suggestion of using the device of Lechler in an agricultural method. In

addition, the Examiner has not supplied evidence of one skilled in the art to apply extermination methods used in a building to agricultural methods.

Allowable Subject Matter

Claim 13 was objected to as being dependent on a rejected base claim and would be allowable if presented in independent form. Applicant has amended Claim 11 to overcome the rejection of that claim, and thus believes that Claim 13 is in condition for allowance.

The Examiner has indicated that Claims 16 – 18 are allowed. Applicant gratefully acknowledges the Examiner's allowance of these claims.

Applicant has also reviewed the other prior art made of record by the Examiner. Applicant respectfully submits that none of these other references, taken alone or in combination with any of the other references of record, anticipate or make obvious Applicant's invention as claimed.

If a telephone conference would expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (415) 409-2900.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES

Additions are shown in **bold-faced, underlined** type. Deletions are **bold-faced** and enclosed in brackets **[ ]**.

In the Claims:

Claims 11 and 22 have been amended as follows:

11. (Twice Amended) A method comprising:

generating a flow **substantially comprising** superheated steam; and

delivering the flow of superheated steam to a plant sufficient to at least partially defoliate said plant.

22. (Once Amended) An agricultural method comprising:

generating a flow of superheated steam; and

delivering the flow of superheated steam to a plant having a graft, where said delivering is sufficient to inhibit a growth **of suckers or canes** on said plant.